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North Korea's Search for Western Technology: How Well Is P'yongyang Doing?

A Research Paper

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North Korea's Search for Western Technology: How Well Is P'yongyang Doing?

A Research Paper

This paper was written by the Security and
Technology Issues Branch, Office of East Asian
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[redacted]

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Key Judgments

*Information available
as of 1 February 1988
was used in this report.*

P'yongyang places high priority on modernizing its civilian and military sectors, making acquisition of advanced Western technology a critical goal.

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Thus far, P'yongyang has faced difficult obstacles:

- The North's sparse diplomatic presence in the West, rudimentary understanding of Western business practices and advanced technology, and severe financial constraints greatly impede collection.
- [redacted] poor internal administration weaken technology collection efforts, and we believe that the erratic top-down decisionmaking process in North Korea magnify administrative problems.

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[redacted] The massive shortfalls facing the North as it modernizes its backward economy help explain the wide-ranging nature of the legal and clandestine collection efforts:

- To boost productivity, the North Koreans import legally a variety of Western capital equipment—heavy machinery, mining equipment, agricultural implements, and telecommunications gear.
- To plug economic gaps and improve military capabilities, P'yongyang has [redacted] supplemented by dual-use purchases, since 1983 for heavy-duty trucks, microelectronics technology, fiber optics, and computer equipment.

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[REDACTED]

The North has focused its technology collection efforts on Japan and Europe since the early 1980s but is becoming increasingly active in Southeast Asia, where export controls are largely nonexistent. We believe the North has enjoyed broad success in Japan, chiefly because established trade and a pro-P'yongyang community of resident Koreans [REDACTED]

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[REDACTED] In Western Europe, P'yongyang conducts operations against high-technology firms and seeks opportunities to acquire restricted Japanese technology and equipment. Singapore, Hong Kong, and Macau are receiving increased attention, especially as sources of microelectronics and computers.

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We believe P'yongyang has obtained only limited amounts of Western equipment as a result of its wide-range efforts. Its acquisition of 87 Hughes helicopters, despite COCOM proscriptions was a spectacular, but rare, achievement. [REDACTED] bureaucratic inefficiency and economic bottlenecks prevent full exploitation of Western equipment and hamper assimilation of technology.

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We believe that P'yongyang faces growing barriers to collection efforts in Japan and Western Europe, making its goals harder to achieve. Japan has shown a newfound willingness to reject sales of nonrestricted technology to the North Koreans, following complaints by Washington that such technology can be used to bolster the North Korean military. Furthermore, increasing scrutiny of North Korean collection efforts by European allies will constrain acquisition activities throughout the Continent.

Under these circumstances, we expect P'yongyang to forage for other targets. China will become an increasingly attractive source as it gains greater access to US-origin goods and technology. The North could also press the Soviets to share their knowledge of advanced Western technology. Third World countries—such as Indonesia, where the North has a diplomatic presence, or Iran, which is a major arms buyer—are other potential targets of opportunity. On balance, we expect the results to be disappointing to P'yongyang.

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**North Korea's Search for
Western Technology: How
Well Is P'yongyang Doing?**

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Like its Soviet, East European, and Chinese allies, P'yongyang places high priority on modernizing its civilian and military sectors, making acquisition of advanced Western technology critical.¹ North Korea's effort has intensified as its leaders have viewed its technological shortcomings against the growing capabilities of the South. Over the last decade, President Kim Il-song has repeatedly stressed in public the importance of closing the widening technology gap with Seoul. In a policy speech on 29 December 1986, for example, he emphasized the need for advanced technology, including electronics and robotics, to improve the North's living standards and upgrade its industry.

What Drives North Korea's Program

The need to modernize its economy and military machine drives North Korea's technology acquisition efforts, but an intense rivalry with the South also motivates the program:

- *North Korea faces chronic shortages of consumer staples and industrial goods, in sharp contrast to South Korea's progress in using technology to modernize its economy.*
- *Most of P'yongyang's military equipment is based on technology of the 1940s' through 1960s' vintage, while the South has been able to modernize its defense industries by adapting advanced technology.*
- *We believe P'yongyang's hope that it could take some of the spotlight away from Seoul by hosting part of 1988 summer Olympics also has driven its attempts to acquire Western technology—in particular, computer and communications technology that could be used in covering the Games.*

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One of the major roadblocks is P'yongyang's limited access to the outside world:

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- North Korea has a sparse diplomatic presence in areas where the most advanced technologies can be found. The North has formal diplomatic relations with only 10 countries in the non-Communist world

**North Korea's Diplomatic Representation
in Non-Communist Countries With
Access to Advanced Western Technology**

	Formal Relations	North Korean Embassy
Australia	Yes	No
Austria	Yes	Yes
Denmark	Yes	Yes
Finland	Yes	Yes
Iceland	Yes	No
Norway	Yes	Yes
Portugal	Yes	Yes
Sweden	Yes	Yes
Switzerland	Yes	Yes
Mexico	Yes	No
France	No	Trade Mission
Kuwait	No	Trade Mission

that have—or can easily access—advanced Western technology and maintains only seven embassies and two trade missions. It has no embassy in two of its major hunting grounds—the United States and Japan.

- Even its few representatives often have limited contacts, because of their generally unsavory reputation. [redacted] the typical North Korean diplomat must earn a portion of his living expenses through outside commercial activities—a requirement that has enticed North Koreans into black marketeering, the drug trade, and illegal arms transfers. Exposure of such dealings in the 1970s has left its mark, scaring away Western businessmen. Moreover, P'yongyang's officials abroad must respond to a variety of conflicting demands on their time, including maintaining the good graces of North Korea's rulers.
- North Korea lacks extensive trade ties to the West or vigorous exchanges of academic, scientific, and business delegations that could scout opportunities for technology acquisition in Western Europe and Japan [redacted]

Other obstacles to the North's collection efforts reflect limitations in both experience and funding. We believe that a poor understanding of Western business practices and only rudimentary familiarity with advanced technology constrain P'yongyang's efforts.

[redacted] severe shortages of hard currency have often thwarted even priority collection efforts. [redacted]

We believe that poor administration also weakens North Korea's technology acquisition efforts. Although P'yongyang's limited finances and serious weaknesses in high technology argue for a carefully structured program, [redacted] North Korean ministries operating individually use their own subordinate logistic components to procure specific technologies abroad. Moreover, changeable instructions from the top probably magnify administrative problems. [redacted]

[redacted] Kim Il-song and his son and designated successor, Kim Chong-il, are notorious micro-managers. The two Kims routinely issue on-the-spot "guidance" for improving productivity at individual plants, farms, and construction sites, but their edicts often disrupt production and interfere with planning. Their erratic directives—which probably affect the technology collection effort as they do other programs in North Korea—leave bureaucrats scrambling to do their bidding, even at the expense of long-term goals.

P'yongyang's Agents: Who Are They?

Despite the obstacles, a wide range of government bodies and quasi-official business groups are [redacted] actively involved in technology acquisition. [redacted]

The Key Operatives

North Korean trading companies are P'yongyang's most active and we believe, most successful, link to Western technology. [redacted]

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Despite their limited numbers and unsavory reputation, diplomats overseas—mostly commercial officers—have apparently been the second most fruitful means of access to Western technology, working largely through North Korea's European missions. In 1984, North Korean commercial officers operating in the West German sector of Berlin arranged for the diversion of 87 US-origin Hughes helicopters from Western sources to North Korea. According to press

[redacted] the diplomats also delivered helicopter replacement parts to their East Berlin mission in the trunks of their cars. Like the trading companies, the diplomats work through Western firms willing to divert proscribed goods. [redacted]

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[redacted] We also believe that diplomats brief and coach visiting "unofficial" delegations to spot opportunities for acquisition. [redacted]

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Like its Chinese and Soviet allies, North Korea to some extent uses academic and business delegations to elicit technical information and occasionally to arrange deals. [redacted]

Looking to Allies

[redacted] the North has received some support at the margins from its allies:

[redacted] the North Koreans are looking to a flow of technology from their Communist allies as a potential growth area. For example, Kim Chong-il in 1987 implied that China's closer relations with the United States would afford

P'yongyang better access to US technology, [redacted] The North Korean press also reported last December that P'yongyang and Beijing had plans to sign a long-term science and technology (S&T) accord. This would follow an emerging pattern of increasing North Korean emphasis on such agreements with Communist allies who operate successful acquisition programs. P'yongyang signed a scientific cooperation accord with Moscow in October 1985, and a new agreement was concluded in June 1987. Also in 1987, North Korea concluded another S&T agreement with Bulgaria, according to press reports. [redacted]

[redacted] the agreement between P'yongyang and Sophia aims at facilitating technical exchanges between the two countries. We believe the accords could afford P'yongyang access to sophisticated Western technical know-how and equipment that its allies already have gathered through overt and covert programs. [redacted]

Technological Wish List

With many North Korean organizations seeking Western high technology in an apparently less than coherent effort, targeting has been marked by a strategy of "anything goes." [redacted] depicts a campaign by P'yongyang that has covered the technological waterfront—from diversion of sophisticated communications and electronics equipment to acquisition of low-tech but nonetheless priority goods, such as heavy-duty trucks. The massive shortfalls facing the North as it seeks to modernize its backward economy are consistent with the wide-ranging nature of this technology acquisition effort. [redacted]

P'yongyang continues to pursue legal acquisition of Western capital equipment to upgrade its industrial base. [redacted] North Korean imports consist mainly of equipment to improve productivity in the mining, steel, textile, agriculture,

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Technologies Sought by North Korea

Dual-Use Technologies

Semiconductors and Equipment

- *Microelectronics production technology*
- *Integrated circuits, production plants, and equipment*
- *Semiconductor manufacturing equipment*

Computers and Equipment

- *Minicomputers and microcomputers (US origin)*
- *Logic analyzer mainframe*

Telecommunications Technology

- *Fiber-optics technology*
- *Microwave technology*

Defense Industry Equipment

- *Avionics technology (US origin)*
- *Electric cable for aerospace vehicles*
- *Hughes helicopters (US origin)*
- *Remotely piloted minivehicles*

Vehicles and Chassis

- *Truck crane chassis*
- *Pole tractor-trailers*

Other

- *Polycrystalline silicon ingots*
- *Sophisticated laser equipment; laser trimming machines*
- *X-ray analysis equipment*

Civilian-Use Technologies

Machinery for Extractive Industries

- *Coal mining and power plant equipment*
- *Offshore oil extraction facilities*

Heavy Industrial Plant and Equipment

- *Steel and aluminum production plants*
- *Paper production equipment*
- *Port and hotel construction equipment*
- *Equipment for production of clothing, shoes, food-stuffs, furniture, kitchen equipment*

Agricultural Equipment

- *Marine food-processing equipment*
- *Hydroponic equipment for vegetable farming*

Consumer-Oriented Goods

- *Language laboratory apparatus*
- *Tape recorders*
- *Television receiving sets*
- *Video camera accessories*
- *Telephone and satellite communications equipment*

and transportation sectors. For example, imports from Japan—North Korea's largest Western trading partner—are made up largely of various electrical and nonelectrical machinery, transport equipment, light manufactured goods, steel products, and chemicals. The composition of imports has remained relatively constant in recent years: machinery and equipment account for 50 percent of the total, other manufactured goods 30 percent, and chemicals 10 percent.

Because of abrupt revisions in the "guidance" issued by the leadership, however, the focus of North Korea's technology imports has shifted significantly over time. In the early 1980s, for example, Western trade statistics showed a surge in mining equipment purchases after P'yongyang announced a major effort to expand its export-oriented extractive industries, especially coal and nonferrous minerals. More recently,

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the leadership has emphasized the need for alleviating energy shortages, and North Korea has expressed interest in importing such items as pipes and equipment for offshore oil exploration. [redacted]

Much of the technology and equipment P'yongyang wants is proscribed from export to North Korea; this makes clandestine acquisition, supplemented by dual-use purchases that can be modified to meet military requirements, a key element of the North's effort. [redacted]

Serious weaknesses in high-technology areas essential to long-term growth also have dictated the North's clandestine shopping list. Although P'yongyang has put out feelers for many types of plants, equipment, and technology, we believe it has attached particular importance to computers, integrated circuits, and telecommunications equipment:

- North Korea shows the most interest in Western semiconductor production equipment, computer hardware and software, integrated circuits, and other electronics-related technology. [redacted]
- P'yongyang has demonstrated increased interest in state-of-the-art fiber optics since the mid-1980s, probably because the technology can be used to upgrade the telephone system and to improve military command and control communications. [redacted]

Foreign Targets: Seeking New Opportunities

P'yongyang has focused much of its technology acquisition operations in Japan and Western Europe, where ethnic Korean communities or willing collaborators have helped in the past. Since the early 1980s, [redacted] Southeast Asia—where most local governments have weak or nonexistent technology export controls—also is receiving increasing attention. [redacted]

... In Japan

Two factors have made P'yongyang's effort to acquire technology most successful in Japan:

- Established trade ties have facilitated both legal and illegal transactions. In 1986, two-way trade with Japan totaled about \$350 million, with Japan providing about 10 percent of North Korea's imports, mainly machinery, and receiving some 10 percent of its exports. The US Embassy in Tokyo notes that about 50 trading firms regularly do business with North Korea and that perhaps as many as 40 are Korean owned.

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... In Western Europe

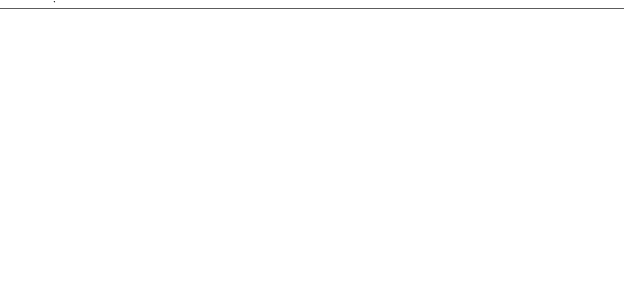
Western Europe is attractive territory for technology acquisition, [redacted]

P'yongyang assigns its most capable commercial officers there. [redacted] the North

Koreans used West Berlin as their chief operations center in Europe until 1987, when the Allied Command banned seven North Korean officers from returning in the wake of the diversion of the Hughes helicopters and replacement parts. [redacted]

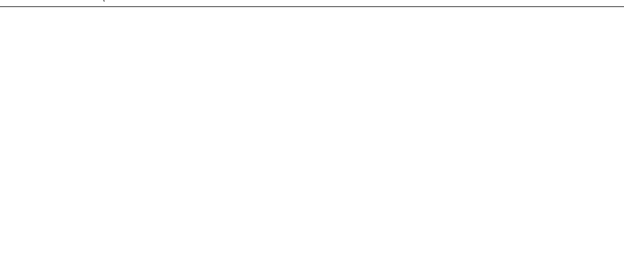


[redacted] North Korea conducts operations against a range of high-technology firms in various West European countries:



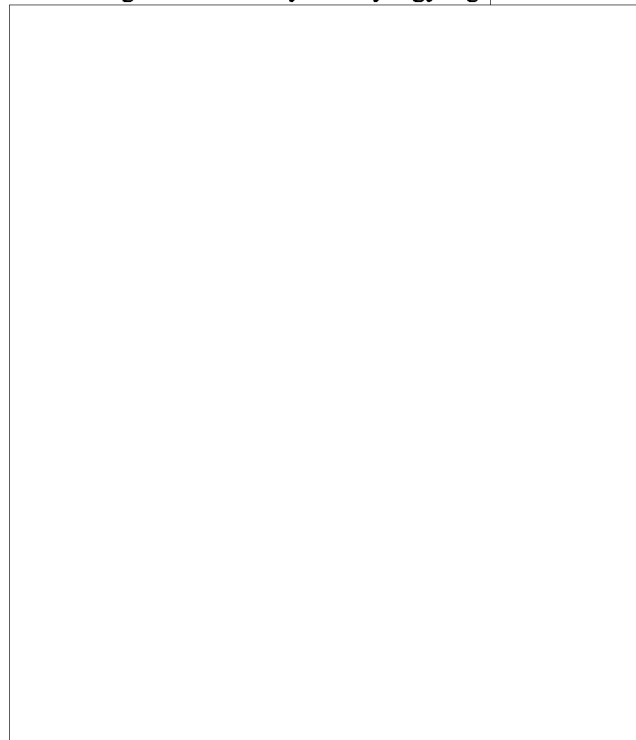
- North Korea is also targeting firms in several European countries, hoping to acquire optical-fiber production plants and equipment. [redacted]

P'yongyang does not overlook opportunities to acquire restricted Japanese technology and equipment through West European countries:



... Elsewhere in Asia

Hong Kong, Macau, and Singapore appear to represent new growth territory for P'yongyang. [redacted]



P'yongyang also may be setting up technology collection operations in Hong Kong. The Chinese press in Hong Kong reported in 1985 that the North was trying to establish a semiofficial trade office there.



We believe Singapore is emerging as another potentially fruitful locale. [redacted]



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Although North Korea is trying numerous avenues to acquire technology, our review of its program suggests that the effort has produced limited results. The Hughes helicopter case was a spectacular achievement.

small successes have done little to modernize North Korea's industry or military. We see three major reasons for this:

- A limited capacity to assimilate high technology. Even when the North Koreans have acquired technology, they have frequently failed to make the most of it. For example, North Korea received assistance from the UN Industrial Development Organization in establishing a pilot plant and training center for the production of bipolar digital integrated circuits. When the plant was completed in December 1986, however, the low yield on usable wafers produced at the plant—about 30 percent—disqualified it as an internationally competitive facility. Moreover, UN officials commented that they could not be responsible for damage to the machines resulting from unsupervised production.
- Economic bottlenecks that prevent exploitation of advanced Western plants and equipment.

- Bureaucratic inefficiency in making use of imported technology. Mismanagement continues to undercut the technology acquisition effort even when success seems in hand. The North Koreans struck a deal with a prominent West European firm for an international telephone exchange system. The company delivered the equipment before receiving full payment and is now trying to obtain its money. While the firm threatens to repossess the equipment, it remains uninstalled in North Korea, exposed to the elements—possibly irreparably damaged—owing to poor internal planning.

In our view, North Korea's goals for technology acquisition will become harder to achieve. Perhaps most damaging will be greater roadblocks in the countries that have been its best sources. In the wake of the Toshiba affair—the scandal surrounding Toshiba Machine Company's illegal sale of milling machines to Moscow in the early 1980s—the Japanese have tightened controls on exports of strategic technology.

Moreover, Japan has shown a newfound willingness to reject sales of nonrestricted technology to the North Koreans, following complaints by Washington that

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such technology can be used to bolster the North Korean military, according to the US Embassy. For Japan, there are few economic or political incentives for brokering such technology sales to the North, which clearly is a risky business partner. Its inability to pay debts to Japanese firms continues to prevent large-scale new trade from developing between the two countries, adding to private companies' hesitation to contract for costly high technology with P'yongyang. Finally, the North's difficulty in paying for Japanese high-technology goods will be compounded by the appreciation of the yen, which will continue to boost the cost of Japanese products. [REDACTED]

P'yongyang's prospects do not look much brighter in Western Europe. The expulsion of seven North Korean diplomats from the Western sectors of Berlin in early 1987 has already hampered P'yongyang's ability to operate there. [REDACTED]

[REDACTED] Furthermore, increasing attention to North Korean activities by European allies will constrain acquisition activities throughout the Continent. We believe P'yongyang's lack of hard currency will continue to limit its outright purchase of Western technology. Even if the North Koreans had the money, their reputations as black marketeers and drug smugglers probably would make most legitimate Western businessmen reluctant to deal with them. [REDACTED]

In the face of growing difficulties to its collection effort in Japan and Western Europe, North Korea is certain to continue to forage for opportunities to gain access to advanced technology. [REDACTED]

[REDACTED] we see several clues to the future directions of these efforts:

- In our view, China will remain a major North Korean contact and target because of established ties and Beijing's expanded access to Western technology. We believe P'yongyang will press hard to tap into China's growing stockpile of US-origin, dual-use and military-related technology.
- P'yongyang also could attempt to boost imports of equipment and technology from the USSR—by far the North's largest trading partner. Although China

shows no willingness to give US technology to North Korea and the Soviets probably would be reluctant to grant new credits for technology purchases, we cannot discount the possibility that P'yongyang's Communist allies will gradually grant the North access to their inventory of advanced Western technologies and know-how [REDACTED]

We also believe the North will continue to scout for opportunities in the Third World:

- For example, North Korea is officially represented in Indonesia—an attractive acquisition site by virtue of a growing base of multinational corporations and its proximity to Hong Kong, Macau, and Singapore.

[REDACTED] Indonesia has just signed an agreement with the United States to implement strategic technology controls, but we expect North Korea to use third-country contacts there to try to evade the program.

- North Korea may begin to explore collection possibilities in trading entrepôts outside Asia, such as the unregulated Panamanian free trade zone.
- P'yongyang also could enter into barter deals with Third World countries—offering arms for technology. We estimate that North Korea's military sales to the LDCs averaged about \$380 million annually between 1980 and 1986 with an especially vigorous arms-for-oil trade conducted with Iran. The North could ask Iran or other countries to help acquire Western computer or other high technology as a quid pro quo for its help in furnishing weapons.

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